

Claim Rejections Under 35 U.S.C. § 103

Claims 2 and 16 are rejected under 35 U.S.C. § 103(a) as obvious over Ference (U.S. Patent No. 6,225,699), McCormick (U.S. Patent No. 6,369,448), or Lin (U.S. Patent App. No. 2003/0205826) in view of McKee (U.S. Patent No. 6,418,029). These rejections are traversed, and reconsideration and withdrawal thereof respectfully requested. The following is a comparison between the invention as claimed and the cited prior art.

An aspect of the invention, per claim 2, is a semiconductor device comprising a BGA substrate having one principal plane furnished with a large number of solder balls and a first semiconductor chip having a first side and an opposite side. The first semiconductor chip includes bumps and active regions formed on the first side. The first semiconductor chip is attached to another principal plane of the BGA substrate through the bumps. A first chip capacitor is attached to the active regions of the first semiconductor chip. The thickness of the first chip capacitor is less than a thickness of the bumps.

The Examiner asserts that Ference (Fig. 1), McCormick (Figs. 1 and 4), and Lin (Figs. 3D and 3E) disclose a BGA substrate and a first semiconductor chip having a first side and an opposite side, including bumps and active regions formed on the first side, wherein the chip is attached to another principal plane of the BGA substrate through the bumps. A second chip with a thickness less than that of the bumps is attached to the active regions of the first semiconductor chip. The Examiner acknowledges that neither Ference, McCormick, nor Lin disclose the required chip capacitor. The Examiner relies on McKee's teaching of a capacitor, with a thickness less than that of solder bumps, attached to a dielectric substrate to assert that it would have been obvious to modify the Ference, McCormick, and Lin devices to attach a chip capacitor that has a thickness less than that of

the bumps to the active region of the semiconductor chip to act as a decoupling capacitor. One of ordinary skill in this art would have been allegedly motivated to make this modification for the benefit of shortening the interconnection distance and thereby lowering inductance.

Ference, McCormick, Lin, and McKee whether taken alone, or in combination do not suggest the claimed semiconductor device. There is no motivation to combine McKee with Ference, McCormick, or Lin in the manner asserted by the Examiner. The chip capacitor of McKee is attached to a dielectric substrate, therefore, if McKee were combined with Ference, McCormick, or Lin the resulting device would feature a chip capacitor **attached to a dielectric substrate**, not to the active regions of a semiconductor chip, as required by claim 2.

Ference, McCormick, and Lin disclose a thin semiconductor chip, surrounded by solder bumps, bonded to another semiconductor chip. It is not clear how the Examiner-asserted motivation would lead one of ordinary skill in this art to modify the devices of Ference, McCormick, or Lin. The Examiner-asserted motivation, “for the benefit of shortening interconnection distance thereby lowering inductance” is to have a decoupling capacitor as close as to the die as possible (col. 2, lines 55-58 of McKee). Therefore, the Examiner-asserted motivation is improper for attaching the chip capacitor, which is attached to the dielectric substrate, to the active region of the semiconductor chip. In short, there is no realistic motivation in McKee to modify the semiconductor devices of Ference, McCormick, and Lin.

Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or

motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge readily available to one of ordinary skill in the art. *In re Kotzab*, 217 F.3d 1365, 1370 55 USPQ2d 1313, 1317 (Fed. Cir. 2000); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). There is no suggestion in McKee to modify the semiconductor devices of Ference, McCormick, and Lin to include a chip capacitor with a thickness less than that of the bumps attached to the active regions of a semiconductor chip, as required by claim 1.

The requisite motivation to support the ultimate legal conclusion of obviousness under 35 U.S.C. § 103 is not an abstract concept, but must stem from the applied prior art as a whole and realistically impel one having ordinary skill in the art to modify a specific reference in a specific manner to arrive at a specifically claimed invention. *In re Deuel*, 51 F.3d 1552, 34 USPQ2d 1210 (Fed. Cir. 1995); *In re Newell*, 891 F.2d 899, 13 USPQ2d 1248 (Fed. Cir. 1989). Accordingly, the Examiner is charged with the initial burden of identifying a source in the applied prior art for the requisite realistic motivation. *Smiths Industries Medical System v. Vital Signs, Inc.*, 183 F.3d 1347, 51 USPQ2d 1415 (Fed. Cir. 1999); *In re Mayne*, 104 F.3d 1339, 41 USPQ2d 1449 (Fed. Cir. 1997). There is no motivation in McKee to modify the semiconductor devices of Ference, McCormick, and Lin to include a chip capacitor with a thickness less than that of the bumps attached to the active regions of a semiconductor chip, as required by claim 1.

The only teaching of the claimed semiconductor device with a chip capacitor attached to the active regions of a semiconductor chip, wherein the thickness of the chip capacitor is less than a thickness of the bumps is found in Applicants' disclosure. However, the teaching or suggestion to make a claimed combination and the reasonable expectation of

success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). The motivation for modifying the prior art must come from the prior art and must be based on facts.

Upon the allowance of generic claim 2, Applicants respectfully request consideration and allowance of species claims 4, 6, 7, and 9, which depend from generic claim 2, as provided by 37 C.F.R. § 1.141.

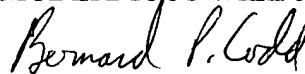
Allowable Subject Matter

Claims 3 and 17-20 are allowed. Applicants gratefully acknowledge the indication of allowable subject matter.

In light of the Remarks above, this application should be allowed and the case passed to issue. If there are any questions regarding this Request for Reconsideration or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,
MCDERMOTT WILL & EMERY LLP



Bernard P. Codd
Registration No. 46,429

600 13th Street, N.W.
Washington, DC 20005-3096
(202) 756-8000 BPC:BPC
Facsimile: (202) 756-8087
Date: October 12, 2004